Neurological Digest.

ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.

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ON THE RELATIONS BETWEEN THE WEIGHT OF THE BRAIN AND ITS PARTS, AND THE STATURE AND MASS OF THE BODY, IN MAN.

John Marshall (Journal of Anatomy and Physiology, Normal and Pathological, vol. xxvi., part iv. July, 1892. Pp. 445–500). The weight of the brain may be discussed simply as an anthropological fact, like stature or body weight, or from the more interesting side of the relation of brain weight to intelligence.

Any one who has at all considered the subject will readily admit that weight is but one of a complex of physical data which have to be taken into account when an inference is made regarding the intelligence, and also that one object of studying this matter is to show what influences affect the weight of the brain, because until these are determined, all inferences from weight to intelligence are worthless—a fact which is at present fully recognized. Such being the situation, this paper by Dr. Marshall is most timely.

It is full of significant and suggestive details, but there are two important points which may be singled out. First, it has been long recognized that in a given race the weight of the female encephalon was less than that of the male. It has further been maintained that this smaller weight in the female was not accounted for by the smaller body weight and stature of women.

Dr. Marshall finds that when the smaller weight and stature in the female are given their proper value in the calculations, the encephalon in the female is proportionately as heavy as in the male.

Second, he has occasion to compare the weights of the encephalon and its parts, taken from sane and also from insane subjects, and finds that though the relative weights of its subdivisions are constantly different in the two series, that nevertheless the figures for the entire encephalon are nearly the same under similar conditions.

In brief outline, the paper is somewhat as follows: Taking the observations of Dr. Boyd on 652 normal males over twenty years of age, and 715 females also over twenty years of age, he groups these in a table for each sex, in seven decennial periods, from 20 to 90 years. The average stature of the individuals in each group is about the same, being a trifle over 66 inches for the males, and a trifle under 62 inches for the females. These tables show a regular progressive decrease in the average brain weight with increase in age. Age, then, is one factor causing a decrease in brain weight.

To study the influence of stature he is forced to use another set of observations also made by Dr. Boyd. The average brain weights of 320 males and 325 females, all insane and over twenty years of age, are arranged in groups according to stature, and, as was to be expected, show that absolutely, both in males and females, the brain in the tall persons is heavier than in the short persons. If, however, the weight of the brain is divided by the number representing the stature of a given group in inches, there is obtained a fraction of an ounce of brain corresponding to each inch of stature. This is called the stature-ratio. This stature-ratio is smaller in the tall persons of both sexes than in the short persons. In general it is smaller for females than for males, indicating in the first place that in tall persons the brain does not increase in weight proportionately with the stature, and further that in women an inch of stature is associated with a smaller mass of brain. Combining the above data with still other observations, he finally exhibits, in tables, figures derived from 1,875 persons grouped according to both age and stature, and subdivided into sane and insane. This gives scope for a more elaborate study of the subdivisions of the encephalon, and at the same time brings out the relations between these in the sane and insane, while the general conclusions previously reached are verified.

Having found the stature-ratio less in the female than in the male, Dr. Marshall next undertakes to give a meaning to these results by introducing the mass of the body into the calculations. It becomes here an accurate investigation of the bit of common knowledge, that women are more lightly built than men. Hence an inch of stature in a woman would stand for a proportionately smaller bulk of tissue, and if the brain stood in a definite relation to the mass of the body, just such a relation as he found to exist regarding stature is that which the case would demand. The weight of the body is geometrically represented by a hypothetical upright, four-sided column of a height corresponding to the stature of the person, bounded by plain surfaces, and having a uniform specific gravity throughout. In the cases which are taken for examination, the weight of a slice or section of this column one inch thick, or the inch-section-weight is for the male 33.4 ounces and for the female 30.2 ounces. These two numbers stand to one another as 1,000 to 904, while the ratio of the brain weight derived from Dr. Boyd's observations are 1,000 for male and 903 for the female, a correspondence which amounts almost to identity and which serves to establish the main point.

The paper is open to the criticism that the averages are often taken by a faulty method, but it should be also stated that, as it happens, this fact does not invalidate the main results. There is a wealth of detail in this paper which defies condensation, but which at the same time gives it unusual value.

FURTHER CONTRIBUTIONS TO OUR KNOWLEDGE OF THE SLIGHTLY ELECTRIC FISHES.

G. Fritsch (Sitzungsberichte d. Königl. Preuss. Akad. d. Wissenschaften zu Berlin, xliv., 1891). An analysis in detail of this paper is not intended here, but there are several of the observations on the nervous system of these fish which are of general interest. The large ganglion cells which give rise to the nerve fibres innervating the electrical organ are located in the spinal cord. They have the position of cells in the ventral coruna of mammals, and their fibres form ventral roots.

A single axis-cylinder process arise from each cell and the protoplasmic processes arise unbranched, but soon fuse with those of neighboring cells by gross connections, which are, beyond all question, so that these cells form a common and continuous group. The nerves, destined for the electrical organ, have moreover the peculiarity that after they have left the spinal canal they undergo a partial decussation, forming a chiasma after the type of the optic chiasma. Again, at about this point in their course, the fibres undergo an increase in number by subdivision to such an extent that there are several times as many fibres entering the electric organ as leave the spinal cord.

As regards the union of ganglion cells and the subdivision of motor-nerve fibres high up in their course it can only be said that to the best of our knowledge these things do not occur in the higher mammals. If such be the case we have not a uniform plan of construction of the nervous system among vertebrates, but what is much better variation, which will probably turn out to be a graded variation. The idea of uniformity has had a depressing effect on histological anatomy, and the sooner it can be replaced by that of gradation in structure, the better. It is a fair statement that no adequate explanation of decussation in the nervous system has yet been offered. Certainly this instance is a very interesting one and is, after that of the laryngeal nerve in certain chelonia as observed by Dr. Wier-Mitchell, the second peripheral decussation of spinal nerves thus far recorded.

THE GROWTH OF MEMORY IN SCHOOL CHILDREN.

T. L. Bolton (American Journal of Psychology, Vol. iv., No. 3, 1892). The author has tested the memory span in some fifteen hundred school children of various grades, by dictating to them series of digits which they then wrote down. A study of these written records and a statistical treatment of the results enables him to draw a number of interesting conclusions, some of which are here given.

The extent of the memory span for the pupils in the public schools is six digits. The memory span increases with age rather than with the intelligence, as measured by the grade of studies pursued.

A good memory span is not necessarily associated with intellectual acuteness as measured by class-room rank. The girls have a longer span than the boys. When the series is too long to be perfectly remembered, the digits forgotten belong to the middle of the series. In other words, it is the ends of the series which are best remembered. In the process of being forgotten, the memory images suffer first a confusion in order, then the right digits are lost and wrong ones substituted for them, and finally digits are lost without any attempt at substitution. These tests yield as good results at the beginning of the day as at the end, showing that the pupils have not been fatigued for this particular kind of work by the school exercises of the day.